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A Step Back

There are different layers of memory going from the CPU to storage

- Registers: few, incredibly fast, very expensive

- L1 cache: bigger, slower

- L2 cache: bigger, slower

- RAM: bigger, slower

  - Speed in nanoseconds

- Secondary storage: SDD/HDD

  - Speed in milliseconds

  - Lots of storage

  - Persistent

  - Incredibly slow

  - Writing/reading data in blocks, which can vary in number of bytes

    - Even if you only need to read a smaller amount of data, you have to read the block size

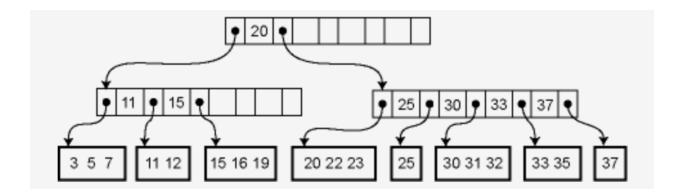Database systems: minimize HDD/SDD accesses

Sorted array of 128 integers (8 bytes each)

- Worst case binary search on 128 integers is way faster than a single additional disk access

- In a binary tree, if the number of values stored in each node increases by one, then the number of (possible) children increases by one

  - Maximizing the number of values in each node means less disk access → faster

◦　Minimize the height of the tree

B+ Tree